1-1-1940

Rural water supplies of South Dakota : Pennington County

South Dakota State University Cooperative Extension

Rural Water Supplies in South Dakota

Pennington County

January, 1940
Special Extension Circular
Number 47

Extension Service
South Dakota State College
Brookings, S. D.

RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

PENNINGTON COUNTY

BY

WALTER V. SEARIGHT

AND

ELMER E. MELEEN

PREPARED BY THE WORK PROJECTS ADMINISTRATION AS A REPORT ON THE WELL SURVEY CONDUCTED AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION SOUTH DAKOTA STATE COLLEGE, IN COOPERATION WITH THE STATE GEOLOGICAL SURVEY.

JANUARY 1940

FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meloen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections, each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent, in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of Flowing Wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

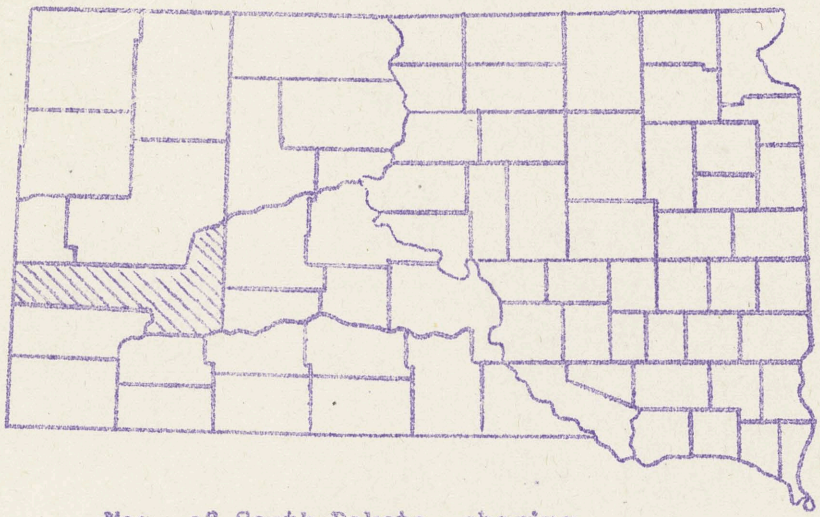
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaire. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

Pennington County

Pennington county is in the west central part of South Dakota, approximately 115 miles south of the North Dakota state line and 60 miles north of the Nebraska line. It is bounded on the north by Lawrence and Meade counties, on the east by Haakon and Jackson counties, on the south by Washington and Custer counties, and on the west by the state of Wyoming.



Map of South Dakota showing
location of Pennington county

Pennington county is, in part, a scenic area of the Black Hills and part of this area and much of the remainder is devoted to agriculture, with approximately 850,697 (47.6 per cent) of a total 1,786,880 acres in farms divided into 1,311 farm units of approximately 603 acres each. A total of 28 per cent of the acreage in farms is under cultivation. Wheat, corn, hay, oats, barley, potatoes, sorghum forage, and rye are the important field crops, being produced in the order named. Livestock is also important; cattle, horses, sheep, and hogs are valued highest.*

Farm units devoted to livestock and to dairy cattle require generally distributed sources of water supply. The supplies required are not great, but adequate and constant supplies of suitable water at low cost are necessary to operate farms of these sizes and organization profitably. The well location

*South Dakota Agricultural Statistics, Annual Report, 1937

map of Pennington county indicates that, in general, such supplies are available and are widely distributed.

On the well location map of Pennington county, any deep pumped and deep flowing wells obtainirg water from artesian sources, mostly the Dakota-Lakota sandstones, are shown in black as artesian wells. All other wells are shown in red and are called shallow wells regardless of depth. On all other maps and in the tables and text of this report, the term shallow wells is applied to those wells of 200 feet or less, in depth and those greater than 200 feet deep are treated as deep wells, including the artesian wells reported.

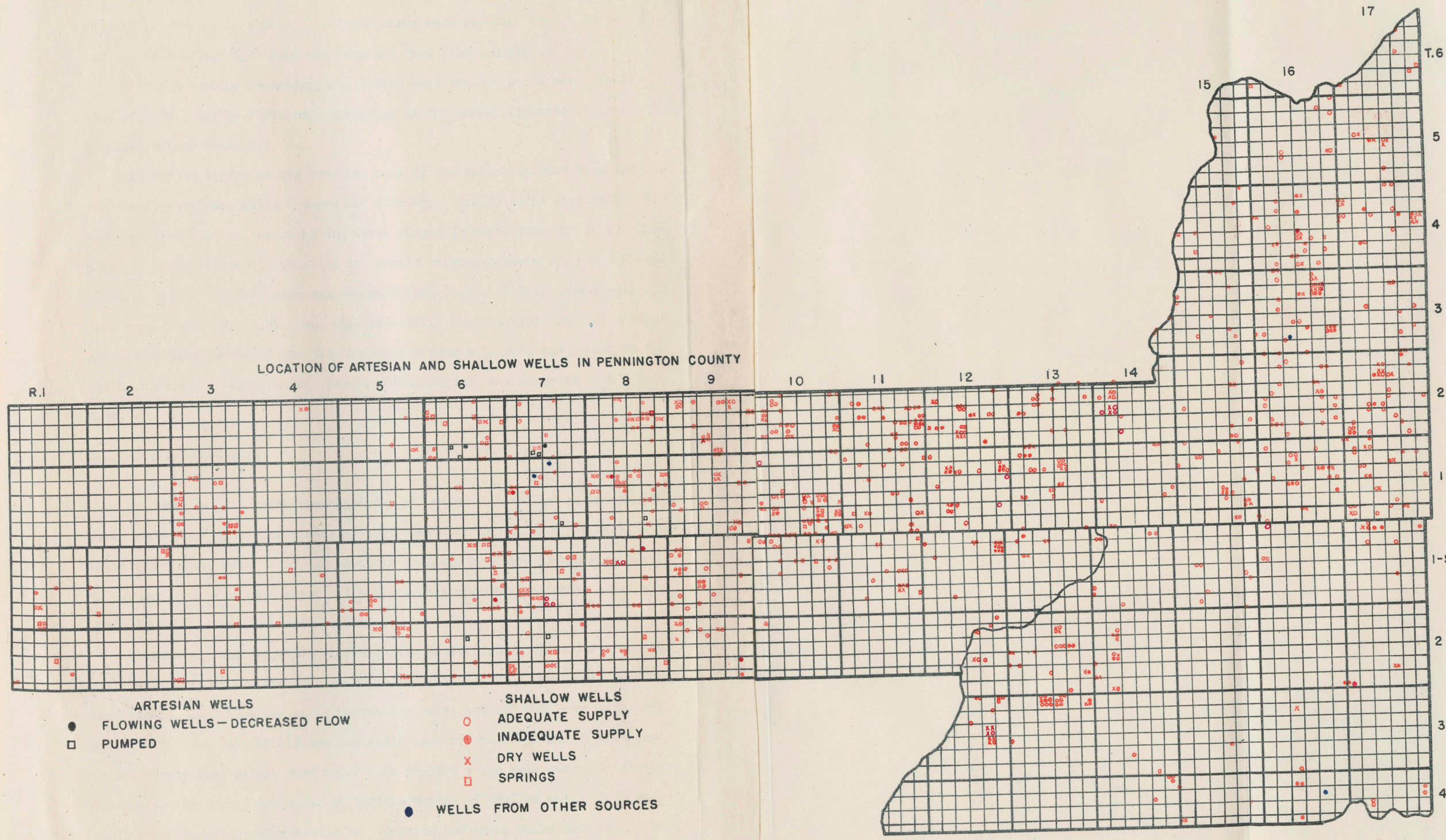
Questionnaires were sent to 1224 farmers and land owners of Pennington county, of whom 522 (42.7 per cent) responded with information on 694 wells, 95 springs and 141 cisterns throughout the county.

DEPTH AND DISTRIBUTION

Well water supplies in Pennington county are widely distributed and are obtained from deep pumped, deep flowing, and shallow pumped wells.

Shallow wells: Approximately 96 per cent of the rural water supplies of Pennington county are obtained from shallow pumped wells, according to reports. Of the 667 shallow wells reported, 82.8 per cent range between 0 to 50 feet in depth; 11.1 per cent between 50 and 100 feet; 3.1 per cent between 100 and 150 feet and 3 per cent between 150 and 200 feet in depth. Thus, approximately 94 per cent of all shallow wells reported were less than 100 feet deep. Wells from 0 to 100 feet also comprise 90 per cent of the total wells reported from the county. Whenever possible shallower supplies are used because of the increased cost of construction of deeper wells and because, in most cases supplies at intermediate depths are not available. However, in those townships reporting shallow wells between 100 to 200 feet deep, supplies were reported to be more reliable than among shallower wells. Approximately 93 per cent of shallow wells ranging between 100 to 200 feet deep, were reported from ranges 15,

LOCATION OF ARTESIAN AND SHALLOW WELLS IN PENNINGTON COUNTY



ARTESIAN WELLS

- ● FLOWING WELLS—DECREASED FLOW
- □ PUMPED

SHALLOW WELLS

- ○ ADEQUATE SUPPLY
- ◉ INADEQUATE SUPPLY
- X DRY WELLS
- ▯ SPRINGS

- ● WELLS FROM OTHER SOURCES

16, and 17. Two wells within this depth range were reported from T.2N., R.7E., and one well at 143 feet deep was reported from T.1N., R.12E.

Of the townships reporting, all listed some shallow wells with the exception of T.3S., R.15E. Fifty nine townships in the county reported all wells to be shallow (see table 1).

Deep Wells: Approximately four per cent of the wells reported from Pennington county were deep wells (pumped and flowing). Twenty seven deep wells were reported from sixteen townships and these ranged in depth from 203 to 970 feet. However, water was mostly obtained at depths ranging between 200 and 300 feet although a well 970 feet deep was reported from T.2S., R.7E., and a well 480 feet deep from T.1N., R.8E., was also reported. The location and the minimum and the maximum depths of the deep wells have been tabulated and appear in table 2 on page of this report. One deep flowing well was reported from T.2N., R.7E.

CHARACTER OF WELL WATERS

In order to determine the character of water from wells in the county, users were asked to indicate whether they considered supplies to be hard, moderately hard, or soft. Although chemical analyses are not commonly available to farmers, usage of the water is a fairly satisfactory criterion until adequate laboratory analyses are available.

In general, shallow wells in Pennington county produce definitely or moderately hard water. Of the shallow wells reported 224 (34.2 per cent) produced hard water; 245 (37.5 per cent) moderately hard; and 185 (28.3 per cent) soft water; 71.7 per cent of all shallow wells were reported to supply definitely or moderately hard water. Hard water from shallow wells were generally distributed over the county and occur at various depths of shallow wells. Soft water wells were reported predominating in fourteen townships which have been tabulated as follows:

Twp.	Range	Soft Water Wells	Twp.	Range	Soft Water Wells	Twp.	Range	Soft Water Wells
4S.	14E.	4	1S.	5E.	9	2N.	6E.	3
4	15	1	1	16	2	2	7	3
2	5	3	1N.	3	10	2	13	8
2	10	1	1	12	9	2	16	14
2	14	7	1	15	8			

The following tabulation shows the percentage of hard, moderately hard, and soft waters at various depth ranges of the shallow wells is indicated:

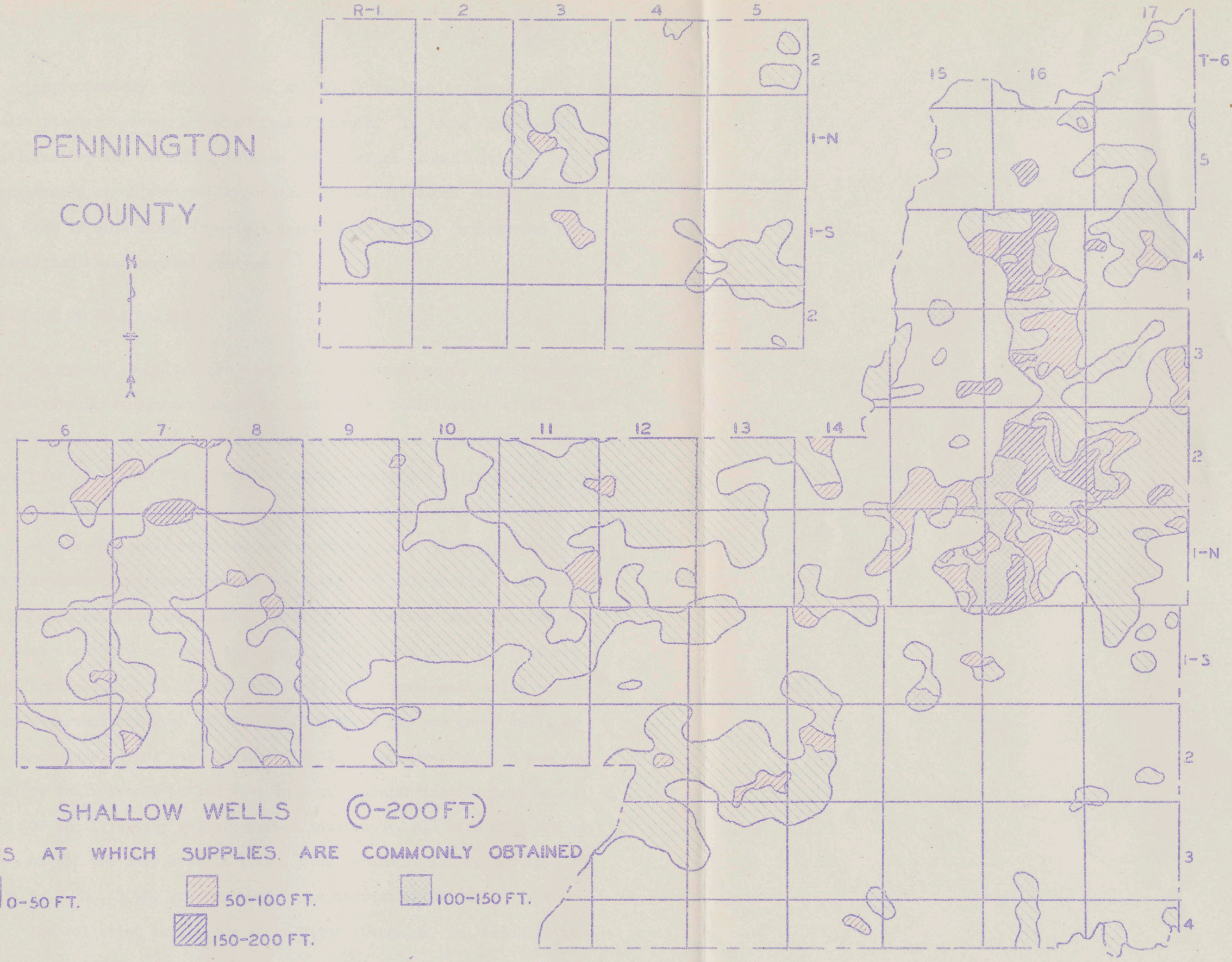
	Hard	Medium	Soft
0 to 50 feet	35.	40.1	24.9
50 to 100 feet	40.9	25.3	33.8
100 to 150 feet	5.	25.	70.
150 to 200 feet	20.	20.	60.

Deep wells, pumped and flowing, produced mostly soft water. Hard water was reported from only one of the deep wells; nine were moderately hard, and seventeen (63 per cent) were soft. Soft water was reported from well in T.2S., R.7E.,(970 feet deep) and the well in T.1N., R.8E.,(480 feet deep) was reported to supply moderately hard water. The deep flowing well in T.2N., R.7E., was reported to supply moderately hard water. From T2N., R.16E., 18 shallow wells and seven deep wells, 20 of which were reported as soft water wells.

Approximately one fifth of the well supplies of Pennington county were reported unsuitable for drinking. Of the 144 unsuitable wells reported, 143 were shallow and one a deep well at 256 foot depth. The unsuitable shallow wells were not localized but were scattered at random over the county. Following are those townships from which more than 25 per cent of shallow wells were reported to be unsuitable for drinking:

Location Twp.	Rge.	Total Shallow Wells Reported	Unsuitable Water	Location Twp.	Rge.	Total Shallow Wells Reported	Unsuitable Water
4S.	16E.	3	2	3N.	14E.	3	2
3	16	1	1	3	15	7	2
2	6	4	2	3	16	19	11
1	8	6	2	3	17	6	3
1	9	20	11	4	15	2	1
1	13	5	2	4	16	18	7
1	17	8	7	4	17	10	9
1N.	15	13	4	5	15	1	1
2	7	5	2	5	16	6	4
2	8	13	6	5	17	4	3
2	12	16	5				

PENNINGTON COUNTY



SHALLOW WELLS (0-200 FT.)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

- 0-50 FT.
- 50-100 FT.
- 100-150 FT.
- 150-200 FT.

PREPARED BY

WORK PROJECTS ADMINISTRATION

O.P. 665-74-3-126 W. P. 3636

MILES

0 2 4 6

Approximately 90 per cent of the unsuitable waters were from shallow wells ranging between 0 and 50 feet in depth. In some cases waters are unsatisfactory for drinking because of surface contamination. In other cases unpalatable or objectionable chemical compounds occur. There is the possibility that in some cases injurious ingredients may be present but these must be identified from chemical analyses.

ADEQUACY OF WELL WATERS

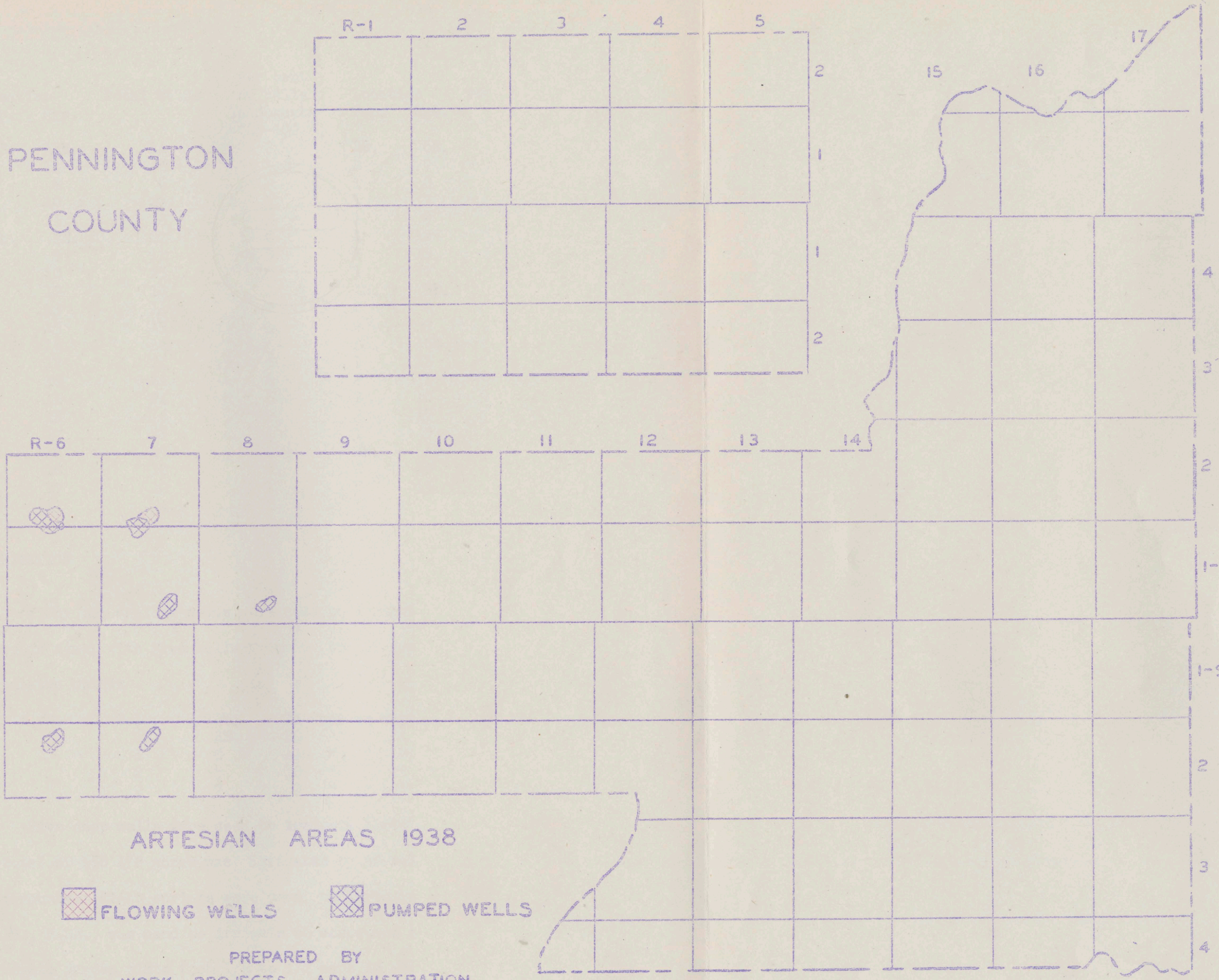
In general supplies are adequate for present needs in Pennington county. Needs vary, however, and changes in land usage, modification of farm management, or dry cycles in this and surrounding land areas would effect the source in many cases and also the demand for water. Nearly one third of all wells reported supply insufficient water for current needs in Pennington county.

Of the 694 wells reported in the county, 212 (30.6 per cent) were reported inadequate for present needs. A total of 207 shallow wells and five deep wells were reported inadequate. Among the shallow supplies, wells from 0 to 50 feet were 31.9 per cent inadequate; wells from 50 to 100 feet were 31.1 per cent inadequate; from 100 to 150 feet, five inadequate wells (23.8 per cent) were reported; and from 150 to 200 feet, three (15 per cent) wells were reported inadequate. Thus in shallower wells approximately 31.8 per cent of all shallow wells from 0 to 100 feet in depth furnish insufficient supplies.

Of the five deep wells reported inadequate, all were from 228 to 280 feet deep except one deep well in T.1N., R.8E. which is 480 feet deep. The flowing well in T.2N., R.7E. was reported to be decreasing in flow.

The following tabulation shows those townships in which 25 per cent to 100 per cent of reported wells were reported inadequate:

PENNINGTON COUNTY



ARTESIAN AREAS 1938

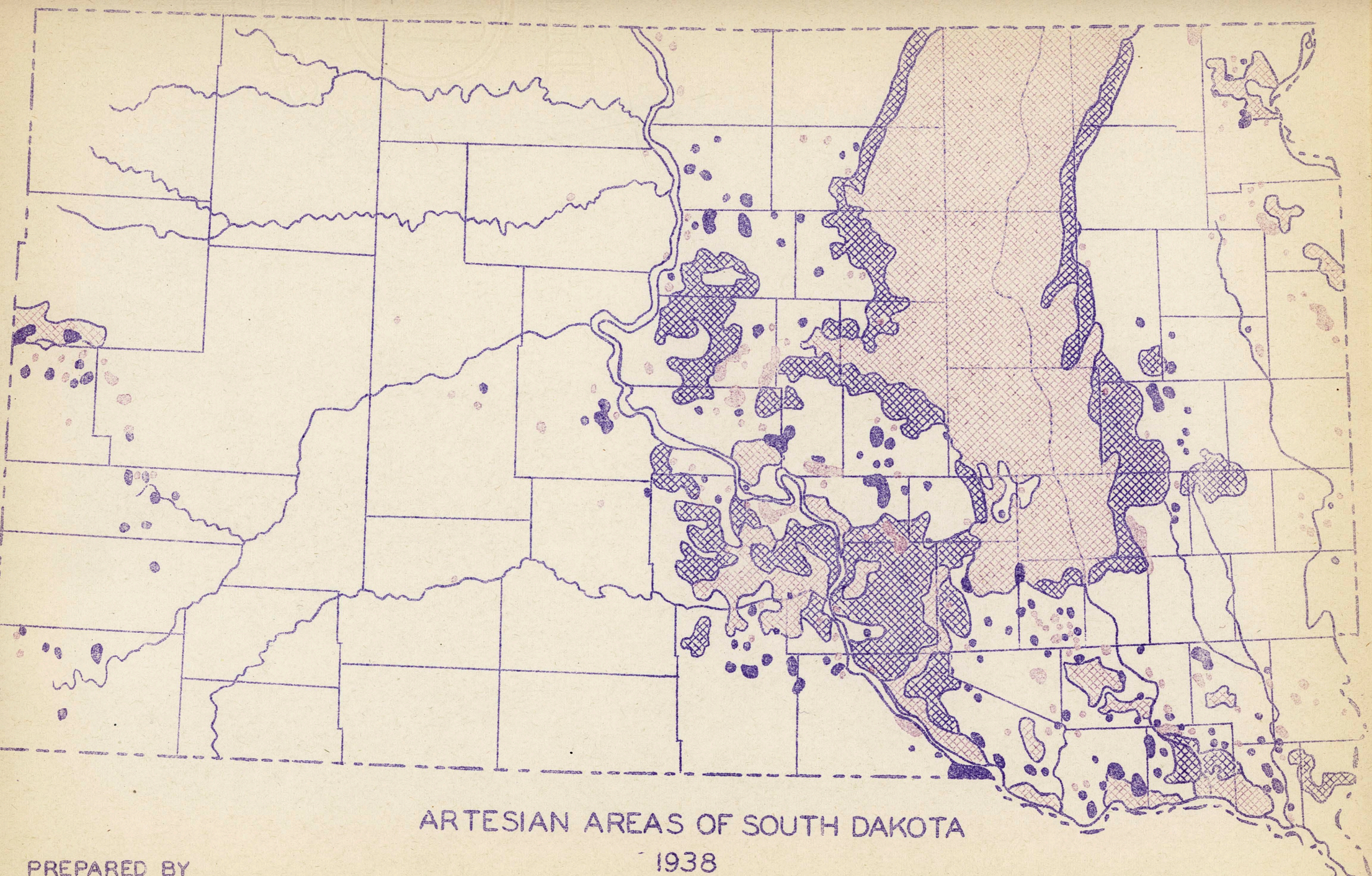
FLOWING WELLS

PUMPED WELLS

PREPARED BY
WORK PROJECTS ADMINISTRATION
O.P. 665-74-3-126 W. P. 3636

N

MILES
0 2 4 6



ARTESIAN AREAS OF SOUTH DAKOTA

1938

PREPARED BY
WORK PROJECTS ADMINISTRATION
O.P. 665-74-3-126
W.P. 3636

FLOWING WELLS

PUMPED ARTESIAN WELLS

Location Twp.	Rge.	Total Wells	Per cent of Wells Inadequate 25-50%	Location Twp.	Rge.	Total Wells	Per cent of Wells Inadequate 50-100%
2S.	13E.	14	6	2S.	6E.	4	2
2	14	5	3	2	7	4	3
1	8	6	2	1	6	8	4
1	10	21	7	1	7	10	5
1	11	8	3	1	9	20	11
1N.	8E.	27	8	1	12	9	6
1	9	11	3	1	13	5	4
1	10	25	10	1	17	8	4
1	12	16	4	1N.	3E.	16	10
1	13	14	5	2	8	13	8
1	15	13	6	2	9	14	7
1	16	16	6	4S.	16E.	3	3 100%
1	17	20	5	3	15	1	1 "
2	10	21	6	2	1	2	2 "
2	11	24	6	2	10	1	1 "
2	15	6	2	2	17	3	3 "
2	17	23	6	1	3	3	3 "
3	16	19	8	2N.	4E.	1	1 "
4	16	18	7	4	15	2	2 "
4	17	12	4	5	15	1	1 "
5	17	4	1				

IRRIGATION

Fifty one shallow wells were used to irrigate garden plots from 1/8 to 1/2 acre in size, with five wells from 9 to 38 feet deep irrigating tracts as tabulated below:

T.1S.	R.10E.	38 feet	in depth	50 acres
1N.	8E.	30 "	" "	4 "
1	8	12 "	" "	20 "
2	5	10 "	" "	60 "
2	7	9 "	" "	7 "

Five deep wells were used to irrigate plots from 1/8 to 1/2 acre in size. A total of 150 1/8 acres was irrigated by 56 wells (both shallow and deep) in the county. Eight springs were used to irrigate 60 7/8 acres. One spring in T.1S., R.2E., was used to irrigate 60 acres, and the other springs were used to irrigate garden plots from 1/8 to 1/2 acre in size.

SUPPLEMENTARY SUPPLIES

Springs are an important source of supplementary water supply in Pen-

nington county and 95 were reported. Among total of 82 of the 95 springs for which character of water was reported, 10 produced hard water; 26 moderately hard; and 46 soft. These soft water springs were scattered generally over the area from which springs were reported. Water from seven springs was reported unsuitable for drinking, and 18 were reported inadequate for current needs. The following tabulation shows the location and number of springs reported from Pennington county:

Twp.	Rge.	Number of Springs	Twp.	Rge.	Number of Springs	Twp.	Rge.	Number of Springs
4S.	15E.	1	1S.	7E.	8	1N.	13E.	2
3	12	3	1	8	3	2	6	9
3	14	1	1	10	1	2	7	4
2	1	1	1	11	2	2	8	2
2	3	2	1	12	1	2	10	1
2	5	1	1	13	1	2	11	2
2	7	5	1	16	1	2	12	2
2	8	2	1N.	3	5	2	14	1
1	1	1	1	5	1	4	15	3
1	2	3	1	7	1	4	16	1
1	3	2	1	8	2	6	16	1
1	4	2	1	10	4	6	17	4
1	6	4	1	11	4			
			1	12	1			

Cisterns are also a most important source of supplementary water supplies in Pennington county, with 141 (approximately one cistern to every five wells) These were used for laundry purposes in hard water areas and for drinking and cooking where well supplies are inadequate or unsuitable. Farmers with shallow wells reported 134 cisterns, of which 86 were used for cooking and drinking and 116 for laundry purposes. Users of deep wells reported only two cisterns, of which both were in use for laundry purposes. Those who used springs reported five cisterns, the water from which was used for cooking and drinking and four for laundry purposes.

DRY HOLES

A total of 210 dry well holes were reported from Pennington county. These range in depth from eight feet to 555 feet. All of the dry holes more than 200 feet deep were reported from the northeastern part of the county.

PENNINGTON COUNTY

Table 1.

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
4-S.	14E.	4	8	75	26	-	-	4	-	-	4	-	-	-
4-S.	15E.	1	-	-	8	-	-	1	-	-	1	-	-	-
4-S.	16E.	3	20	30	23	2	-	1	2	2	-	3	-	-
4-S.	17E.	4	12	18	16	1	2	1	1	1	4	-	-	-
3-S.	12E.	4	13	43	28	1	3	-	-	1	4	-	-	-
3-S.	13E.	14	11	60	28	-	10	4	-	-	12	2	1	-
3-S.	14E.	1	-	-	-	-	1	-	-	-	1	-	-	-
3-S.	15E.	None												
3-S.	16E.	1	29	29	29	-	1	-	1	1	1	-	-	-
2-S.	1E.	2	4	22	13	-	2	-	-	-	-	2	-	-
2-S.	5E.	5	16	24	17	-	2	3	-	-	4	1	1	-
2-S.	6E.	4	24	27	25	-	2	2	1	2	2	2	1	-
2-S.	7E.	4	22	60	38	-	4	-	-	-	1	3	-	
2-S.	8E.	8	7	32	20	2	6	-	1	1	6	2	-	-
2-S.	9E.	6	11	28	23	3	3	-	1	1	4	2	-	-
2-S.	10E.	1	30	30	30	-	-	1	-	-	-	1	1	1/4
2-S.	12E.	5	15	52	26	2	3	-	1	1	5	-	2	3/4
2-S.	13E.	14	14	54	30	2	8	3	1	-	8	6	1	
2-S.	14E.	8	20	57	40	-	1	7	-	-	5	3	3	1/8
2-S.	15E.	None												
2-S.	17E.	3	20	20	20	1	1	1	1	-	-	3	1	1/8
1-S.	1E.	5	14	32	20	1	2	2	-	-	4	1	-	-
1-S.	2E.	1	14	14	14	-	1	-	-	-	1	-	-	-
1-S.	3E.	3	50	81	65	-	2	1	1	-	-	3	-	-
1-S.	4E.	2	13	20	16	-	2	-	-	-	2	-	-	-
1-S.	5E.	13	10	65	28	1	3	9	2	-	11	2	1	-
1-S.	6E.	12	8	45	15	1	5	6	1	-	8	4	2	1/2
1-S.	7E.	9	15	36	23	1	8	-	-	2	5	4	-	-
1-S.	8E.	6	14	28	18	4	2	-	1	2	4	2	-	-
1-S.	9E.	20	7	35	17	15	3	2	10	11	9	11	2	1/2
1-S	10E.	21	8	55	44	10	6	5	1	3	14	7	2	50 1/2
1-S.	11E.	11	6	42	22	1	7	3	-	1	8	3	-	-
1-S.	12E.	9	8	30	20	3	3	3	2	2	3	6	1	-

PENNINGTON COUNTY

Table 1

(Cont.) DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number Of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
1-S.	13E.	5	12	35	21	1	4	-	2	2	1	4	-	-
1-S	14E.	8	23	66	40	5	3	-	2	-	7	1	1	1/2
1-S.	15E.	6	10	100	55	1	2	3	1	1	6	-	-	-
1-S.	16E.	2	170	170	170	-	-	2	1	-	2	-	-	-
1-S.	17E.	8	10	40	23	6	2	-	2	7	4	4	-	-
1-N.	5E.	16	6	53	20	2	3	10	3	2	6	10	2	1/4
1-N.	6E.	2	8	12	10	-	2	-	-	-	2	-	1	1/2
1-N.	7E.	13	9	76	25	6	6	1	1	2	12	1	1	1/8
1-N.	8E.	26	8	60	20	11	13	1	3	5	19	7	5	25
1-N.	9E.	11	12	31	23	2	8	1	-	1	8	3	-	-
1-N.	10E.	25	9	45	23	7	8	10	3	4	15	10	3	1/8
1-N.	11E.	14	6	55	25	6	3	5	-	1	13	1	3	1
1-N.	12E.	16	8	143	32	2	4	9	2	3	12	4	-	-
1-N.	13E.	14	4	50	27	3	10	1	1	1	9	5	2	1/8
1-N.	14E.	4	20	82	46	3	1	-	1	1	4	-	1	-
1-N.	15E.	13	25	160	83	4	1	8	3	4	7	6	1	1/8
1-N.	16E.	16	16	196	72	3	5	8	3	2	10	6	-	-
1-N.	17E.	20	10	120	25	11	8	1	2	4	15	5	-	-
2-N.	4E.	1	14	14	14	-	-	1	-	-	-	1	-	-
2-N.	5E.	3	10	12	11	-	2	1	-	-	3	-	1	60
2-N.	6E.	5	12	80	41	-	2	3	-	-	4	1	-	-
2-N.	7E.	5	40	190	101	2	-	3	1	2	5	-	2	7
2-N.	8E.	13	9	32	23	9	4	-	1	6	5	8	-	-
2-N.	9E.	14	12	60	26	6	4	2	2	-	7	7	-	-
2-N.	10E.	21	8	50	24	4	8	7	1	4	15	6	3	1/4
2-N.	11E.	24	8	50	25	5	10	9	3	4	18	6	1	-
2-N.	12E.	16	12	57	27	7	5	4	2	5	13	3	1	-
2-N.	13E.	14	2	32	14	1	5	6	2	1	13	1	-	-
2-N.	14E.	4	9	55	35	1	1	2	-	1	4	-	-	-
2-N.	15E.	6	20	130	73	2	2	2	-	1	4	2	1	-

PENNINGTON COUNTY

Table 1

(Cont.) DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
2-N.	16E.	18	14	180	97	3	1	14	2	1	16	2	2	1/4
2-N.	17E.	21	10	178	52	9	8	4	2	4	16	5	-	-
3-N.	14E.	3	16	23	20	3	-	-	1	2	3	-	1	1/2
3-N.	15E.	7	16	165	75	2	2	2	3	2	6	1	-	-
3-N.	16E.	19	19	200	66	14	1	1	4	11	11	8	-	-
3-N.	17E.	6	10	70	31	2	3	-	1	3	5	1	-	-
4-N.	15E.	2	10	35	23	2	-	-	1	1	-	2	-	-
4-N.	16E.	18	8	200	62	8	6	3	4	7	11	7	-	-
4-N.	17E.	12	10	160	43	9	2	-	1	9	8	4	-	-
5-N.	15E.	1	30	30	30	1	-	-	-	1	-	1	-	-
5-N.	16E.	6	15	180	78	4	2	-	1	4	6	-	-	-
5-N.	17E.	4	20	35	31	3	1	-	1	3	3	1	-	-
6-N.	17E.	1	17	17	17	1	-	-	-	-	1	-	-	-
Total		667				224	245	185	91	143	460	207	51	148 1/2

PENNINGTON COUNTY

Table 2.

DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approximate Acres Irrigated
3-S.	15E.	1	260	260	260	-	-	1	-	-	-	1	-	-
2-S.	6E.	1	250	250	250	-	-	1	-	-	1	-	-	-
2-S.	7E.	1	970	970	970	-	-	1	-	-	1	-	-	-
1-S.	7E.	1	280	280	280	-	1	-	-	-	-	1	-	-
1-N.	8E.	1	480	480	480	-	1	-	1	-	-	1	-	-
1-N.	15E.	1	250	250	250	-	1	-	-	-	1	-	-	-
1-N.	16E.	2	203	203	203	-	1	1	-	-	2	-	-	-
2-N.	6E.	1	246	246	246	-	1	-	-	-	1	-	-	-
2-N.	7E.	1	220	220	220	-	-	1	-	-	1	-	1	-
2-N.	15E.	1	225	225	225	-	1	-	-	-	1	-	-	-
2-N.	16E.	7	214	238	224	-	1	6	-	-	6	1	2	1/2
2-N.	17E.	2	228	233	231	-	-	2	-	-	1	1	-	-
3-N.	15E.	1	220	220	220	-	-	1	-	-	1	-	-	-
3-N.	16E.	3	218	256	235	-	1	2	-	1	3	-	1	1/8
4-N.	16E.	1	300	300	300	-	-	1	-	-	1	-	-	-
4-N.	17E.	1	240	240	240	1	-	-	-	-	1	-	-	-
Totals		26				1	8	17	1	1	21	5	4	5/8

Table 3.

DATA ON FLOWING WELLS

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY					
Twp.	Rge		Min.	Max.	Ave.	Hard	Med.	Soft	Corroded Casing	Unsuitable for Drinking	Adequate	Inade-quate	Number used for Irrigation	Approx-Acres Irrigated	Ave. Gallon PerMin.	Number Con-trolled
2-N	7E.	1	259	259	259	-	1	-	-	-	1	-	1	1	-	-

NOTE: No other flowing wells were reported from Pennington County.

PENNINGTON COUNTY WELL NOTES

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

Twp. 1S., Rge. 2E.
Sec. 1
10 feet:
"We can get wells on this farm but they don't last for any length of time--we need a good well badly."

Twp. 1S., Rge. 3E.
Sec. 23
50 feet:
"Water is very hard and its a long way to water."

Twp. 1S., Rge. 5E.
Sec. 30
65 feet:
"Have to drill through rock in order to reach water."

Twp. 1S., Rge. 6E.
Sec. 9
14feet:
"I always had plenty of water up until a year ago. It is going dry as there is now 3 ft. of water about 4 ft. below normal and the vein is much smaller."

Twp. 1S., Rge. 6E.
Sec. 11
6 feet:
"This is the description of well located on deeded land; it is a spring that has been dug out and curbed with rocks. The water supply has decreased in the last two years, before it gave plenty of water. On my leased Government property I have a well close to the house with a hand pump. This is a dug well about 2 ft., it has good soft water."

Twp. 1S., Rge. 8E.
Sec. 2
28 feet:
"I also have a spring on the place used for stock but has an insufficient supply--soft water."

Twp. 1S., Rge. 10E.
Sec. 1
19 feet:
"There have been several holes dug here but none were as deep as the well I have now. The water comes from Black Shale."

Twp. 1S., Rge. 11E.
Sec. 23
18 Feet:
"We drilled a number of wells here to a depth of 50 ft. and found no water."

Twp. 1S., Rge. 11E.
Sec. 28
40 feet:
"There are chances for a more plentiful supply of water at a greater depth but the possibilities are indeed limited. I have several dry holes here."

Twp. 1S., Rge. 12E.
Sec. 33
18 feet:
"This well is fed from gravel bed of Rapid Creek. In this part of the lower valley there is hardly any chance to get a well except possibly artesian wells, located in the gravel drifts caused by floods of Rapid Creek. On table land (second bench) wells are obtained in gravel drifts at the top of shale level, water is, as a rule pure and excellent for domestic use."

Twp. 1S., Rge. 15E. Sec. 25	25 feet: "One well was dug but could not keep a durb in it because of quicksand."
Twp. 1S., Rge. 17E. Sec. 4	22 feet: "Five years ago I recased the well and tried to dig it deeper but was unable to get the curb deep enough to keep the quicksand out so was forced to give it up. This well used to water 50 head of cattle but won't supply 5 head now."
Twp. 2S., Rge. 3E. Sec. 19	6 ft. spring. "I have several springs used for stock water, all are located in pasture. I dug a well by the house but since the drought years it has been dry most of the time."
Twp. 2S., Rge. 7E. Sec. 17.	60 feet: "This is in the limestone formation and also in the cave district. It is hard to get a good flow of water in a shallow well."
Twp. 2S. Rge. 12E. Sec. 22	20 feet: "I had difficulties getting water near buildings. Several Wells were dug but all had small veins and water had a bad taste."
Twp. 2S., Rge. 14E. Sec. 32	20 feet: "I have not had enough water on my place since 1930, my farm is honeycomed with test wells. When I dig a well I find a small streak of sand at 15 ft. with a little water in it, but not a sufficient supply. Below 15 to 20 ft. we strike bad land dirt and can't get water there at all. The well I have at present time gives a gallon every 3 hours."
Twp. 2S., Rge. 17E. Sec. 31	20 feet: "Only place you can find water is in draws."
Twp. 3S., Rge. 13E. Sec. 4	"The two well locations marked on questionnaire are 11 and 12 ft. to water. They were dug but never cased the estimated flow is stronger than other wells on farm--the water is hard."
Twp. 4S., Rge. 14E. Sec. 1	12 feet: "From 1927 to 1931 I watered 300 head of cattle from this well. All springs or wells on this ranch run over when these sand hills have plenty of water. But since the drought water supply in them isllow."
Twp. 1N., Rge. 3E. Sec. 5	"No water was found in 40 ft. well on slope near former streem. I can find water in gulch but the supply is insufficient."
Twp. 1N., Rge. 7E Sec. 18	36½ feet: "We are now digging a well by hand near our building site, we do not expect to hit water until 34 ft. is reached. Practically all digging has been done with dynamite

as we are on a solid formation of limestone and sandstone at 34 ft. level."

Twp. 1N., Rge. 7E.
Sec. 30

22 feet:
"Seem to get down 3 or 4 ft. then strike limestone and then granite."

Twp. 1N., Rge. 8E.
Sec. 9

16 feet:
"Typhoid germs in well--not fit for use."

Twp. 1N., Rge. 8E.
Sec. 10

32 feet:
"No rock or shale. The strata of gravel was struck at 30 ft. and 2 ft. in thickness, the gravel contained a good flow of excellent water."

Twp. 1N., Rge. 10E.
Sec. 23

13 feet:
"Spring 10 ft. from well but isn't much good."

Twp. 1N., Rge. 10E.
Sec. 26

24 feet:
"I had two more wells on another quarter but water was so bad I filled them up."

Twp. 1N., Rge. 10E.
Sec. 29

9 feet:
"Plenty of water from well in normal times, could not pump it dry last June. In the fall of 1936 it furnished water for house only. I hauled water two miles in 1934-35 and 36. Had two wells bored, one 52 ft. and one 30 ft. No water."

Twp. 1N., Rge. 11E.
Sec. 9

19 feet:
"I have a well on Sec. 12 the NE¼ well is 10 ft. deep and 8 ft. wide, curbed with stone and cement, pump by windmill. Waters 50 head of stock, water is good and soft."

Twp. 1N., Rge. 12E.
Sec. 8

15 feet:
"I have found it impossible to get water on my place other than indicated although at least 3 holes have been dug to depths varying from 20 to 50 ft."

Twp. 1N., Rge. 14E.
Sec. 2

30 feet:
"Difficulties have been encountered in digging wells because of striking fine sand at the water level. If we could get thru the fine sand we could secure a good supply of fair grade water."

Twp. 1N., Rge. 15E.
Sec. 6

75 feet:
"I have drilled about 110 wells in this county and most all wells are found in blue shale. A few north of Wall in blue clay. All water was found in first 30 ft. of blue shale. I ran a slush bucket rig and could always see just what each foot of dirt looked like. In all wells I have drilled, I only hit one place where I had to go down to 100 ft. before I struck water. Any well that is used often enough to pump dry will eventually fail. My well when drilled ran 3 5/8 per minute. I watered 234 head of cattle in 1931 and in 1933 I watered 60 work horses and 22 head of cattle with big supply tanks."

Twp. 1N., Rge. 15E. Sec. 22	145 feet: "The difficulty here is striking a good vein of water. Water is found in a layer of fine black sand and shale."
Twp. 1N., Rge. 15E. Sec. 35	140 feet: "This farm has two wells both are weak. We are unable to find a well with a sufficient flow."
Twp. 1N., Rge. 17E. Sec. 27	10 feet: "Have been unable to locate well on farm that is fit to human use. I also need a cistern here."
Twp. 2N., Rge. 6E. Sec. 10	11 feet: "No difficult encountered in getting wells here."
Twp. 2N., Rge. 6E. Sec. 35	26 feet: "The ground where the well is drilled is underlaid with caves, no water above caves and drilles can't go thru them. Another drilled well in valley had water above cave but drill struck cave at 100 ft. and lost water but put in a false bottom, but there is very little water. We drive most of our stock 1½ miles to water."
Twp. 2N., Rge. 7E. Sec. 33	220 feet: "We have drilled artesian well down to water bearing sand 220 ft. We also have dug a spring next to house which is 4 ft. deep and runs a small stream of water and a pipe to house. It appears that 12 running springs also forms a small creek here."
Twp. 2N. Rge. 7E. Sec. 34	190 feet: "It is believed that an artesian basin exists at 600 ft. for an artesian well on an adjoining farm located about 150 yards from this place, flows about 140 gallons per minute from a 3 inch pipe."
Twp. 2N., Rge. 8E. Sec. 26	32 feet: "Have tested many places but this is the only place we could find water. All blue shale sub-surface and does not furnish much water."
Twp. 2N., Rge. 9E. Sec. 18	16 feet: "All these wells had a good flow at one time then failed.
Twp. 2N., Rge. 9E. Sec. 28	32 feet: "It is very difficult to find water here as I have dug four wells ranging from 15 to 35 ft. in depth without finding any amount of water. Neither of the two wells described will give over 300 gallons per day in winter and since 1930 both have been going dry in summer."
Twp. 2N., Rge. 10E. Sec. 28	40 feet: "There is also a dug well in house, 16 ft. deep, stone curbed, 10 ft. from surface to water, caseing is good used for domestic purpose only and water is clear and of medium quality."

Twp. 2N., Rge. 10E. Sec. 31	20 feet: "Most of water on this place seems to poison stock. Water is hard to find here, (good water.)"
Twp. 2N., Rge. 14E. Sec. 20	9 feet: "A well for irrigation is desired but at a depth of 15 ft. fine sand is encountered. Well curbs have to be driven in these cases and is quite an undertaking."
Twp. 2N., Rge. 16E. Sec. 32	65 feet: "Cannot locate water veins."
Twp. 2N., Rge. 17E. Sec. 27	48 feet: "Cannot get good drinking water, too hard for household use.
Twp. 3N., Rge. 16E. Sec. 5	40 feet: "Water is easy to get here, as five wells were dug but water is too hard."
Twp. 3N., Rge. 16E. Sec. 25	40 feet: "Blue shale begins at surface and is very hard to go through. I have been unable to get enough water for stock. I have only a small steel cistern which corrodes and spoils the water for drinking in a very short time after filling."
Twp. 4N., Rge. 15E. Sec. 11	35 feet: "Wells cave in easy because of the nature of the soil."
Twp. 4N., Rge. 16E. Sec. 22	25 feet: "My well is useless now, as floods and rain caved it in. I am going to try and locate a well on the up-land but the difficulty is rocks, gravel and shale. I will probably go down 80 to 100 ft."
Twp. 4N., Rge. 17E. Sec. 18	160 feet: "In this well we got plenty of water at 20ft. but it was too hard, unfit for house use. We cased this water out and drilled down 140 ft. and got a little water which was good and soft but was unable to keep surface water out. We can get any amount of water from 15 to 30 ft. but is very hard, not safe for horses in hot weather."
Twp. 5N., Rge. 16E. Sec. 12	85 feet: "I don't think this well can be pumped dry, as it waters 100 head of stock. I have a 20 barrel tank. The water isn't bad to drink but we usually use spring water to drink."

EXTENSION SERVICE
SOUTH DAKOTA STATE COLLEGE
of Agriculture and Mechanic Arts
Brookings, South Dakota

Published and distributed under Acts of Congress, May 8 and June 30, 1914, by the Agricultural Extension Service of the South Dakota State College of Agriculture and Mechanic Arts, Brookings, A. M. EBERLE, *Director*, U. S. Department of Agriculture cooperating.